REMARKS

Claims 1, 2, 3, 12, 21 and 22 remain in this application. Claim 3 is amended herein to correct a typographical error. Claims 4-11 and 13-20 are cancelled herein without prejudice and claims 21and 22 are added herein. Favorable reconsideration and further examination of claims 1-3, 12, and 21 is respectfully requested. And initial consideration and examination of claim 22 is respectfully requested.

In the Final Office Action of parent application no. 09/438,913 dated September 24, 2003, claims 1-3, 12 and 21 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,434,637, in the name of D'Errico ("D'Errico") in view of U.S. Patent No. 4,835,690, in the name of Gangarosa et al. ("Gangarosa"). This rejection is respectfully traversed.

As discussed in Applicant's response under 37 C.F.R. §1.116 dated January 23, 2004, claim 1 recites a method of scheduling operations for logical volumes in a data storage system. The method includes determining, for a plurality of priority classes, which operations associated with each of the priority classes have been requested for a logical volume, and selecting one of the operations by performing a probability-based operations lookup based on the determination.

D'Errico neither teaches nor suggests determining, for a plurality of priority classes, which operations associated with each of the priority classes have been requested for a logical volume, as set forth in claim 1. Instead, D'Errico describes a mechanism for selecting a system path (from among multiple system paths) between a host and a system resource for transmission of "a next I/O operation." See Abstract; Col. 2, lines 36-39. Therefore, D'Errico is concerned with the selection of a path from host system to storage system for each consecutive I/O operation, not with the selection of an already requested I/O operation for logical volume operations scheduling. It follows then the D'Errico

neither teaches nor suggests selection of an operation by performing a probability-based operations lookup based on the determination, as is further set forth in claim 1.

In the Advisory Action in parent application no. 09/438,913 dated February 6, 2004, the Examiner states that "the prior art (D'Errico) teaches determining, for plurality of priorities, which I/O operations will be directed to specific logical volumes that are critical to the performance of the application with which they are associated (for example, see col. 12 lines 2-16)."

Applicants respectfully point out that D'Errico teaches that selection of a path for a particular I/O operation can be based on several factors (i.e., selection criteria) in order to improve system performance. These factors include consideration of the percentage breakdown of I/O operations for each path between reads and writes, consideration of the estimated hit ratios for the particular application for both reads and writes (col. 7, lines 53-60), and the device that is targeted by the I/O operation (col. 9, lines 17-21). D'Errico further teaches that in the process of selecting an appropriate one of multiple paths, priority may be given to certain I/O operations that are critical to the performance of the application with which they are associated. (col. 11, lines 9-65). It is within this context that the excerpt of col. 12, lines 2-16 to which the Examiner refers further teaches that "the priority scheme [to prioritize certain I/O operations] can be implemented by giving priority to certain target devices which are known to be the targets of I/O operations that are critical to the performance of the application with which they are associated."

However, the D'Errico teaching that priority can be assigned to certain I/O operations that are critical to the performance of the application and/or to certain target devices known to be the targets of such performance critical I/O operations does not suggest or motivate the method of claim 1, of selecting an operation by performing a probability-based operations lookup based on a determination of which operations

associated with each of a plurality of priority classes have been requested for a logical volume.

Gangarosa also neither teaches nor suggests any part of the claimed operations scheduling method. Gangarosa relates to the scheduling of patient examinations involving use of a scanner for optimal use of the scanner. Col. 6, lines 21-23. Thus, while the claimed method requires that it be determined which operations associated with priority classes have been requested for a logical volume, the scheduler of Gangarosa (scheduling means 18) is instead concerned with prioritizing patient examinations subject to given time constraints. Col. 6, lines 27-33. The probability-based operations lookup based on the determination is therefore lacking as well in Gangarosa.

Thus, Applicants submit that claim 1 is patentably distinct from D'Errico and Gangarosa, whether taken separately or in combination, as neither reference teaches or suggests the method of claim 1.

Dependent claims 2-3 depend from and further limit claim 1. Thus, claims 2-3 are patentable for at least the reasons given above with respect to claim 1.

Nevertheless, it is submitted that dependent claim 2 is further patentable over the cited references since neither D'Errico nor Gangarosa, whether taken separately or in combination, describes or suggests the method of claim 1 wherein the probability-based operations lookup comprises using a table of entries corresponding to different operations, further comprising forming a plurality of first selection values, one corresponding to each of the priority classes, based on the determination, selecting one of the priority classes based on the determination, and selecting a corresponding one of the plurality of first selection values corresponding to the selected one of the plurality of priority classes as a lookup index pointing to one of the entries.

Dependent claim 3 is also believed to be further patentable over the cited references since neither, whether taken separately or in combination, describes or

suggests the method of claim 2, wherein the probability-based operations lookup comprises a first lookup level corresponding to a probability-based priority class lookup and a second lookup level corresponding to the probability-based operations lookup, and wherein selecting one of the priority classes comprises: deriving a second selection value from the first selection values, and using the second selection value as a first lookup index at the first lookup level and using the selected one of the first selection values as a second lookup index at the second lookup level.

Independent apparatus claim 12 is similar in scope to claim 1. Claim 21, directed to a data storage system, also is similar in scope to claim 1. Thus, claims 12 and 21 are believed to be patentable over D'Errico and Gangarosa for at least the reasons given above with respect to claim 1.
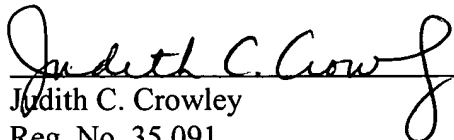
Applicants have added a new claim 22. Consideration of new claim 22 is respectfully requested.

The entire application is believed to be in condition for allowance. Such action is respectfully requested.

Authorization to charge Daly, Crowley & Mofford, LLP Deposit Account No. 50-0845 for any fees dues or credit any overpayment is hereby given.

Respectfully submitted,

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